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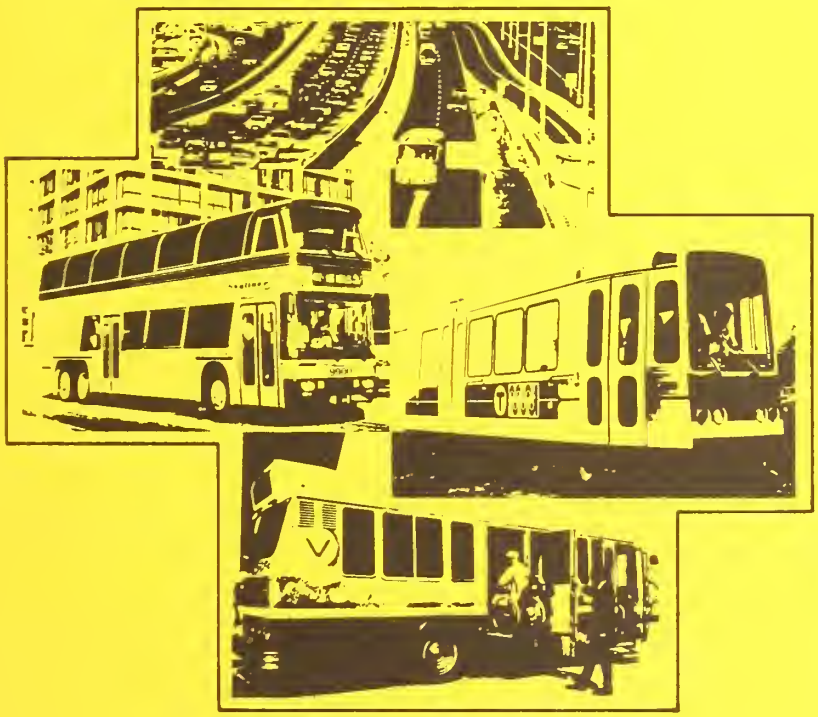
Service and Methods Demonstration Program

ANNUAL REPORT
Executive Summary

August 1979



U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration
Office of Service and Methods Demonstrations
Washington, D.C. 20590

NOTICE

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16. Abstract

This report contains a summary of the contents of the Service and Methods Demonstration Program Annual Report for Fiscal Year 1978. Program activities and accomplishments discussed in the Annual Report are reviewed including findings and insights from current demonstration projects, descriptions of future projects, and support activities in the areas of evaluation methodology and information dissemination.

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METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimetsrs	cm
yd	yards	0.9	metsrs	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inchss	6.5	squsre centimeters	cm^2
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yd^2	square yards	0.8	square meters	m^2
mi^2	square milss	2.6	squsre kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	tesspoons	5	milliliters	ml
Tbsp	tablespoons	15	millilitsrs	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	qusrts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius tempersture	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimetsrs	0.04	inches	in
cm	centimetsrs	0.4	finches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
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m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	squsrs miles	mi^2
ha	hectares (10,000 m^2)	2.5	ecres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
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l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
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m^3	cubic meters	1.3	cubic yards	yd^3
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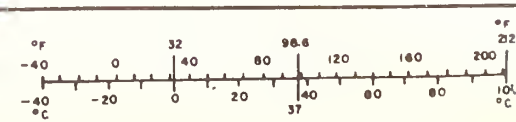

PREFACE

Information exchange on a timely basis is of crucial importance to the Service and Methods Demonstration Program activities. One element in that effort is an annual accounting of the results of the previous year's activities in both sponsoring local innovations in public transportation and monitoring related local initiatives. It is hoped that bringing this together in one annual source document will aid transportation policy formulation at local, state, and Federal levels. This is the fourth year that an annual report of program activities has been published.

This annual report is developed for the Service and Methods Demonstration (SMD) Program by the Office of Systems Research and Analysis at the Transportation Systems Center. It is prepared in close collaboration with SMD Program staff, various private contractors retained to carry out specific research and evaluation tasks, and local staff directly involved with the innovations being reported. It is important to note that operational demonstration projects represent a cooperative effort in policy research among state, local, and Federal levels of government. At the state and local levels, there are usually several different public agencies involved with the implementation and operation of a demonstration under the leadership of a lead local agency. It is clearly not a unilateral Federal effort, but an effort that depends heavily on state and local initiative. The SMD Program is very appreciative of the many partnerships it has formed with state and local innovators, and the courage and competence they are exhibiting in the testing of the many project concepts under consideration in the program. Often there is controversy and political risk associated with these tests until the fears as to what might be an outcome are replaced by actual positive results. Our hope is that these vanguard efforts will benefit all those interested in urban public transportation improvements.

Ronald J. Fisher
Director, Office of Service
and Methods Demonstrations

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The staff of UMTA's Service and Methods Demonstration Program provided useful guidance during the preparation and review of this report. The authors thank Ronald J. Fisher, Bert Arrillaga, James Bautz, Larry Bruno, Mary Martha Churchman, Paul Fish, Marvin Futrell, Joseph Goodman, Stewart McKeown, Vincenzo Milione, and Lynn Sahaj for their assistance. In addition, the authors wish to thank the other members of the Urban and Regional Research Division of the Transportation Systems Center who contributed to the production of this report. Mark Abkowitz, Larry Doxsey, and Carla Heaton contributed project summaries for this report. Howard Slavin provided insight and appropriate direction during the review phase. Grant Paul directed the final preparation and formatting of this report. Finally, Vera Ward and Terry McTague contributed many hours in typing and revising the text.

EXECUTIVE SUMMARY

The UMTA Service and Methods Demonstration (SMD) Program was established in 1974 to provide a consistent and comprehensive framework within which innovative transportation management techniques and transit services could be developed, demonstrated and evaluated, and the resultant findings disseminated in a timely manner to transportation planners, policymakers and transit operators. The program focuses on strategies that involve the imaginative use of traffic management, pricing and marketing techniques, transit service variations, and existing technology to produce improvements which require relatively low levels of capital investment and which can be implemented in a short time frame.

Demonstration projects sponsored by the SMD program specifically address one or more of UMTA's major program objectives. These objectives are to:

1. Provide more efficient public transportation service;

2. Provide more effective public transportation service;

3. Bring about the use of local regulatory and pricing authority to encourage ridesharing and transit use;

4. Develop a mix of innovative transit service models that appeal to a wide range of user groups;

5. Integrate the use of private and public providers into a comprehensive set of public transportation services;

6. Develop information to assist local, state, and Federal policy formulation;

7. Guide an improved level of local response to UMTA regulations concerning TSM, E&H, and Alternatives Analysis.

Innovative service and methods concepts that support the above objectives are actively sought by the SMD program. Demonstration ideas can emerge either from concepts developed within the program itself or from promising strategies which have received limited application in the United States or elsewhere. These ideas are initially analyzed in feasibility studies or case studies to determine the desirability of testing them in an actual demonstration.

Before a promising new concept is likely to be adopted into complex urban environments, there must be sufficient experience about its costs, impacts, and acceptance to encourage its use outside the SMD program. Consequently, the selection of an appropriate demonstration site and careful structuring of the implementation and evaluation is crucial to the success of the demonstration. Application of a concept in different size cities or with variations which appear to be warranted is generally necessary to understand how and under what conditions a viable concept has the most potential.

Since the inception of the SMD program in 1974, over 50 demonstration project grants have been awarded. Evaluation activities were completed on twelve of these projects as of the end of FY78. In addition, 14 special evaluations of non-SMD funded projects have been completed. The program has also conducted over 25 analytical and planning studies of new concepts, crosscutting studies of concepts implemented at more than one demonstration site, and special research aimed at improving the state-of-the-art in evaluation methodology.

This report contains a brief summary of the activities and accomplishments of the SMD program during FY78. Emphasis is given to higlighting the relevant findings of the service and methods concepts being tested, the gaps that still exist in our understanding of their effectiveness, and the direction of future efforts to fill these gaps. Project activities are organized into four major program areas: (1) Conventional Transit Service Innovations, (2) Pricing and Service Innovations, (3) Paratransit, and (4) Service for Special User Groups. SMD activities in the areas of Demonstration Project Evaluation and Information Dissemination, which are common to all four of these program areas, are summarized first.

DEMONSTRATION PROJECT EVALUATION

The SMD program represents a cooperative and coordinated effort in applied policy research involving organizations at the Federal, state, and local levels. The evaluation of individual demonstrations does not take place in an isolated laboratory setting, but rather is intimately related to the conduct of the demonstrations themselves. The process which is employed for planning and implementing the evaluation allows for close and frequent interaction among the various participating organizations to ensure appropriate coordination of demonstration and evaluation

activities and to secure agreement as to respective responsibilities.

The SMD program attempts to maximize the quality and usefulness of information gathered from the demonstrations by developing and employing a consistent, carefully structured approach to demonstration evaluation using state-of-the-art data collection and analysis techniques. Each evaluation addresses three basic questions: 1. What changes were made to the transportation system? 2. What were the impacts of these changes on travelers, providers, and other groups? 3. Why did these impacts occur? To answer these questions, evaluation activities consist of careful documentation of the events and circumstances surrounding the implementation and operation of the project as well as detailed analyses of the impacts and cause-and-effect relationships. Since demonstrations vary in terms of objectives, relevant issues, complexity, content, and context, the scope and emphasis of each evaluation are tailored to the specific characteristics of the demonstration.

In support of its activities, the SMD program occasionally conducts state-of-the-art research in evaluation methodology. Recent methodological research undertaken by the SMD program includes two analyses of the use of attitudinal measurement techniques to forecast patronage for innovative transit services and a study of alternative sampling procedures for collecting data on individual travel behavior.

INFORMATION DISSEMINATION

Service and Methods Demonstration projects and other program activities can only have the intended nationwide impact on public transportation improvements if the technical findings are made available in the appropriate form to planners and decisionmakers. Therefore, effective information dissemination is essential to achieving the ultimate goal of technology transfer.

There are a large number of ways in which demonstration project findings can bring about beneficial transit improvements in other metropolitan areas. Demonstrated innovations can be replicated elsewhere according to recommendations in the evaluation reports. Findings regarding the resolution of complex issues that surface during a demonstration can be very helpful in avoiding adverse impacts of similar implementations elsewhere. Project evaluations provide specific recommendations on the

applicability of service concepts and conditions where they are likely to be most effective. Even in cases where the overall project concept is found to be unworkable or costly, certain components of a demonstration often have potential in other contexts. Finally, project cost and service results can be used by planners and policymakers in conducting alternative analyses leading to investment decisions, and data from project evaluations can be used to develop improved tools for transportation planning.

Project findings are disseminated to a variety of target groups including transportation planners, transit operators, and local and state governments. Therefore, much effort has been devoted to identifying these target audiences and to developing the appropriate channels of communication. Since the SMD program attempts to facilitate change and improvement, it has adopted an aggressive approach to communicating important findings to those who might benefit and in publicizing the projects underway and the products that are being made available.

A variety of publications which contain findings from project evaluations, results of analytical studies, and guidelines for planning and implementing innovative concepts, are produced and distributed. Project evaluation reports contain both a detailed assessment of project impacts and implications for transferability that are useful to decisionmakers. Case studies of innovative practices initiated outside of the SMD program are conducted where it appears that the service concept has sufficient applicability to warrant a wide dissemination of findings which would not otherwise occur. Manuals prepared for distribution to urban areas provide guidance for implementing and planning new services that have been proven in demonstration projects. These manuals are published in separate volumes intended for policy-level officials, project leaders, and the planning team.

SMD staff regularly participate in a wide variety of technical conferences dealing with public transportation. Seminars and workshops are sponsored by the SMD program where they can serve a purpose in bringing together key industry representatives for dissemination or discussion purposes. Site visits to demonstration projects by representatives of other urban areas are actively encouraged. Visits by demonstration project grantees to other similar projects are also being encouraged to promote discussion of common issues and develop informal communication networks.

Audio-visual presentations are another effective medium which has been used by the SMD Program to disseminate findings about innovative transportation services to a wide audience. Such presentations can enhance the information provided by written material and can occasionally substitute for a site visit to an innovative operation or a group of similar transportation systems.

Research sponsored by the SMD Program on the diffusion of transportation innovations is currently underway. Results of the first phase, a study of the diffusion of dial-a-ride (DAR), indicate that key actors in the initiating stage were elected officials who usually had no particular expertise in transportation. Interpersonal channels of communication were useful in first learning about DAR, while print media were more useful during the implementation stage. Consultants were found to be the single most important channel of communication about the implementation of DAR projects. These and other findings from the study of the spread of innovations will be useful to the further development of the information dissemination components of the SMD program.

CONVENTIONAL TRANSIT SERVICE INNOVATIONS

A major concern of transit operators, and urban transportation planners and policymakers is how to allocate existing resources to provide satisfactory transportation service at an acceptable cost. However, the selection of appropriate strategies for allocating existing transportation resources is a complex problem involving difficult tradeoffs between cost and level-of-service, and one which is constrained by legal barriers, long-range policy decisions, and available system capacity.

The SMD Program has played a major role in identifying and evaluating various strategies designed to achieve more efficient use of existing transportation and urban resources. Current activities may be grouped into four broad categories:

1. Priority Techniques for High Occupancy Vehicles -- strategies aimed at more efficient allocation of the existing urban highway network to increase system capacity and improve traffic flow.

2. Traffic Restrictions -- innovative, alternative uses of urban road space for other than automobile traffic.

3. Transit Service Improvements -- strategies designed to improve the productivity, level-of-service and coverage of conventional fixed-route bus operations.

4. Vehicle Innovations -- alternative applications of existing vehicle technologies to improve conventional transit service and to promote more efficient allocation of existing urban roadspace.

Priority Techniques for High Occupancy Vehicles

Over the past several years, a great number of locally initiated and SMD-sponsored projects involving priority treatment for High Occupancy Vehicles (HOV) have been implemented. These projects have produced some definitive and transferable findings concerning the effectiveness and practicality of implementing various strategies, and have pointed out promising directions for future efforts in this area.

Evidence from several sites has shown that reserved HOV lanes on congested urban freeways are effective in increasing average vehicle occupancy and, consequently, the passenger carrying capacity of existing highway facilities. The public acceptability of this strategy, however, is highly dependent on the type of reserved lane which is implemented.

Non-separated, concurrent-flow freeway lanes appear to be the most difficult of the reserved-lane strategies to implement and maintain from an institutional standpoint. Among the problems cited with this strategy are: 1. lack of public acceptance, manifested in high lane violation rates; 2. difficulties in enforcement of lane restrictions; 3. increases in accidents on the facility; and 4. deterioration of traffic flow on the main freeway lanes, especially if the reserved lane is created by elimination of an existing travel lane.

Contraflow lanes on freeways for buses or other large, specially licensed vehicles have been demonstrated to be effective and reasonably safe to operate. This strategy has a somewhat limited application potential, however, because it requires a significant traffic flow imbalance in order to take advantage of underutilized capacity in the non-peak direction. There is also a non-negligible operating cost involved to insert and remove the lane separators twice a day.

Physically separated reserved freeway lanes for buses and four-person carpools - Shirley Highway, Virginia.

Contraflow bus lane on Marquette Ave., Minneapolis, Minnesota.

Physically separated, exclusive lanes or roadways have generally received the greatest public acceptance, and have suffered the fewest institutional and operational problems of all reserved-lane strategies. However, this option also requires substantial capital expenditure for new highway construction. In selecting among the three strategies, therefore, a major determinant should be whether the strategy is viewed as a short term, stopgap measure, or as an integral component of the urban area's future transportation system.

Another strategy which has been demonstrated to be effective, safe, relatively inexpensive, and publicly acceptable in providing priority treatment for HOVs on urban freeways is the installation of bypass lanes on freeway access ramps which already have ramp metering. The major unresolved problem with this strategy is preventing illegal use of the bypass lanes by ineligible vehicles.

Priority treatment strategies on freeways can also help improve the level-of-service and enhance the productivity of express bus operations. Service attributes which are most likely to be improved because of reserved lanes or ramp bypasses are travel time and schedule reliability. These attributes, along with service frequency and coverage, have been shown to be most influential in attracting new express bus riders.

The development of park-and-ride lots adjacent to freeway facilities employing priority treatment appears to be an effective complementary strategy to increase express bus patronage by expanding its potential service area without substantial increases in operating costs. In order to realize their full potential, however, such lots must be carefully located and properly designed.

While significant savings in travel time can be realized on urban freeways through priority treatment strategies, these savings can easily be lost as a result of traffic congestion on arterial streets in the downtown. Moreover, the effectiveness of priority treatment strategies on downtown streets is highly dependent on the number of bus stops and the level of enforcement within the treatment area. Consequently, strategies involving bus-only streets or contraflow arterial lanes for express buses are more likely to achieve significant travel time savings and reliability improvements than concurrent flow, curbside bus lanes for downtown bus operations.

Another strategy which has shown promise for improving downtown bus operations involves the use of traffic signals.

Although experience with this technique has been somewhat limited, there is is evidence that priority treatment using traffic signals can achieve travel time reductions of from 10 to 30 percent when used in combination with other strategies such as reserved bus lanes or bus-only streets. Of the two principal priority strategies involving traffic signalization, signal progression appears to be nearly as effective as preemption for express bus operations on reserved arterial lanes. Moreover, it is likely to be substantially less costly to implement, since many cities already have interconnected traffic signals.

Future SMD activities in the area of priority techniques for HOVs will focus on the refinement and modification of techniques which have not been particularly successful in the past, and the exploration of promising new techniques, particularly those involving downtown arterial streets, which have thus far seen limited application. Demonstration projects currently on the planning or early implementation phases include: 1. the construction of a contraflow reserved freeway lane in Houston, TX; 2. a comprehensive program of transit priority improvments in downtown San Francisco, CA; 3. case study evaluations of two concurrent-flow reserved freeway lane projects to be implemented by the New Jersey Department of Transportation; and 4. a demonstration of priority signalization involving trolleybuses in Philadelphia, PA.

Traffic Restrictions

Increasing concern about the need to enhance the quality and economic vitality of urban areas, especially the downtown, has fostered interest in a broad set of strategies involving geographic restrictions on automobile traffic. The SMD Program is currently examining several concepts which are designed around this objective. These concepts include transit malls, auto restricted zones, and neighborhood traffic and parking restraints.

A transit mall is a street on which transit vehicles are given exclusive or near-exclusive use, sidewalks are widened, and other amenities are provided for pedestrians and waiting transit patrons. Automobile access is prohibited or strictly limited, except for cross-street traffic. A recently completed, SMD-sponsored comparative evaluation of three U.S. transit malls in Portland, OR, Minneapolis, MN, and Philadelphia, PA provides significant insight regarding implementation and operational issues and the impact of transit malls on the urban environment.

Transit malls appear to be relatively inexpensive compared to other capital improvements in urban areas, with construction costs ranging from $15 to $33 per square foot. Maintenance costs are somewhat higher than for other urban streets due to a higher level of upkeep and more elaborate amenities.

Construction activities can produce slight temporary disruptions of pedestrian and business activities in the area. However, careful phasing of construction, and the use of interim pedestrian walkways can significantly reduce any adverse impacts which may occur.

Transit malls do not appear to have adversely affected traffic congestion on adjacent streets. In many instances, only minor adjustments in signalization were required to handle the diverted traffic, and existing parking facilities absorbed any losses of on-street parking spaces.

Violations of bus-only streets by automobiles does not appear to be a serious problem. However, violations are most likely to occur where autos are allowed to enter certain blocks to access off-street parking facilities.

Goods delivery is least likely to be adversely affected where rear alleys can be utilized. Delivery charges may increase slightly if goods movers are forced to limit deliveries to certain hours or travel longer distances on foot to reach their destinations.

Pedestrian amenities and the overall ambiance of an area are generally enhanced by a transit mall, but there is no current evidence of overall increases in retail sales directly attributable to the presence of a transit mall. This strategy should therefore be viewed as one element of a more comprehensive package for urban revitalization; one which provides a retail focus and an aesthetically appealing transportation link between new developments.

An auto restricted zone may be thought of as a generalization of the transit mall concept to encompass a larger area of automobile exclusion. The implementation and operation issues and impacts are likely to be similar to those experienced with transit malls, except in scope. For this reason, ARZs are being considered as potential focal points for downtown redevelopment.

The SMD Program is currently sponsoring four ARZ demonstrations in Boston, MA, Memphis, TN, Providence, RI, and New York City, NY. Thus far, only the Boston and Memphis projects have actually been implemented, and it is

too early to reliably assess their impacts. However, careful monitoring of the planning and implementation stages in Boston have revealed how important obtaining the cooperation and endorsement of the downtown business community are to the ultimate success and viablity of the project.

The SMD Program has also recently completed a comparative study of traffic restraint in residential neighborhoods. Two basic strategies were found to be employed most often in the United States -- residential parking programs and physical traffic restraint devices. Residential parking permits have been shown to be an effective and legal mechanism for reducing non-residential use of neighborhood parking spaces. Other potentially effective strategies include bans on curbside parking, limitations on the number of consecutive parking hours, and alternate side parking requirements with changes during the mid-day.

Traffic restraint devices have been shown to be effective in discouraging through traffic from low and medium density residential neighborhoods. The devices which are currently available vary in terms of their restrictivensss, performance, degree of self-enforcment, and cost, and thus provide a wide range of options to suit individual neighborhood objectives and characteristics.

Transit Service Improvements

The transit service improvement demonstrations are examining various techniques and strategies designed to make more effective use of the transit operator's available resources to provide improved service. The service changes being investigated range from generalized techniques applicable to an entire transit operation to strategies which may be appropriate only under very specific conditions. Demonstrations currently in progress or in their final planning stages include: 1. a comprehensive program of route restructuring in Denver, CO; 2. two demonstrations of programs to improve transit system productivity in Columbus, OH and Omaha, NE; 3. two demonstrations of strategies to improve transit service reliability in Minneapolis, MN and Oakland, CA; 4. a special study of three locally initiated timed transfer coordination projects in Denver, CO, Portland, OR, and Orange County, CA; and 5. a demonstration of the zoned bus concept in Dade County, FL.

Vehicle Innovations

From time to time, the SMD Program sponsors demonstrations of innovative vehicle designs or other transit equipment as market tests to provide an initial data base on which local transit operators can make investment decisions. Two such demonstrations which have recently been implemented include a special case study of high speed waterborne commuter transit service in Boston Harbor, MA and a test of a bicycle accessible transit system in Santa Barbara, CA.

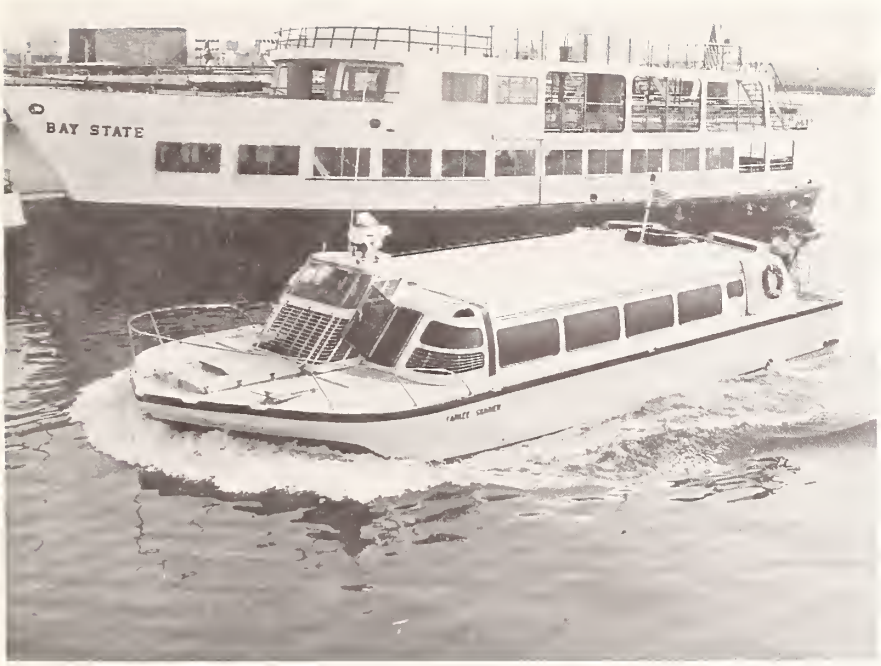
TRANSPORTATION PRICING INNOVATIONS

The application of pricing policies to control the volume, pattern and composition of traffic, and to reduce automobile usage in favor of high occupancy modes represents a promising set of tools by which transportation planners and transit operators can increase the efficiency of existing transportation systems. Typically the role of pricing has been solely that of revenue generation. A major reason for the limited role of pricing policies in achieving broader objectives has been that local planning staffs lack an empirical basis for predicting the impact of these policies and their relative effectiveness compared to service improvements.

The SMD program has embarked on an extensive series of experiments in different metropolitan areas to demonstrate and evaluate the extent to which a broad range of pricing and service policies can be used to encourage the use of high occupancy vehicles. The experience gained from these efforts is shedding light on the relative impacts of price and service variations, and will provide the empirical basis which local planning staffs require in formulating operating policies.

Fare Payment Strategies

Exact change fare policies, which are in effect on most American transit systems, can cause various operational inefficiencies depending upon the particular operating policies of the transit system. Boarding times may be lengthened if passengers have to queue up and board through one door, or as they search for exact change. On transit systems where passengers pay on exit, peak-period delays may be caused as alighting passengers push through crowds of standees to pay their fares at the front. Finally, the requirement for exact change is an inconvenience to some



"Yankee Skimmer" waterborne commuter transit demonstration - Boston Harbor, Massachusetts

Automatic fare identification recorder used in Portland, Oregon for credit card postpayment.

individuals and may serve as a disincentive to their use of transit.

The SMD Program is currently studying the potential for various fare payment strategies to improve operating efficiency and make transit more convenient for riders. Reduced-price promotions of transit fare prepayment (TFP) instruments were conducted in Austin, TX and Phoenix, AZ. At these sites, all passes and tickets were sold at 20% and 40% discounts during two one-month sale periods. In Sacramento, CA and Jacksonsville, FL, employers are being solicited to institute pass distribution programs at the workplace. In addition, the experience gained from small-scale experimentation with fare postpayment (credit card) strategies is being studied to assess the feasibility of implementing the strategy on a systemwide basis. Finally, it is anticipated that a demonstration of a self-service fare collection system, which is common in Europe, will be implemented during FY79 or FY80.

Preliminary findings from the TFP reduced-price promotion demonstrations indicate that although many riders who normally pay cash fares bought TFP during the sales, few non-transit riders used the promotions as an opportunity to experiment with the transit system. Evidently non-transit riders perceived that the costs of learning to use the bus system and obtaining the tickets outweighed the potential benefits to be realized during a one-month sale period.

Although people who use TFP instruments tend to be those with higher than average transit use, the demonstrations which have been completed to date provide no evidence that TFP purchase induces increased transit usage.

The ongoing costs of operating a TFP program are often low, since much of the distribution is carried out by banks, convenience stores, civic organizations, etc. on a voluntary basis. Employers may also be expected to participate in the distribution and sale of monthly passes if they perceive that their employees will benefit from the program. The impacts of TFP programs on cash flow, boarding times, and cash management costs are likely to be small, but are dependent on the particular form of the TFP program.

The limited experimentation which has occurred with credit card postpayment systems has shown that they can: (1) facilitate the implementation of flexible fare structures; (2) supply timely ridership and revenue data; and (3) provide a convenience to passengers. However, further hardware development will be required before the

concept can be implemented in the operating environment of an urban bus system.

Fare-Free Transit

Fare abolition is intended to increase transit ridership, relieve traffic congestion, reduce transit boarding times, and enhance downtown revitalization. However, there are many gaps in the current knowledge regarding the costs and benefits of fare-free public transit service. It is uncertain whether fare abolition is a cost-effective means of improving transit efficiency, and concerns exist regarding equity issues, especially the income distribution effects of spending large sums of money to subsidize the losses in revenue.

The uncertainties regarding the costs and benefits of fare-free transit have motivated the development of a series of SMD-sponsored fare-free demonstration projects and case studies of locally initiated projects. In Mercer County (Trenton), NJ and Denver, CO, off-peak fares have been eliminated on a systemwide basis. Knoxville, TN and Albany, NY are eliminating fares within a specific portion of the downtown. Finally, the SMD Program has sponsored after-the-fact case studies of downtown-area fare-free projects in Seattle, WA and Portland, OR.

The demonstrations have shown that off-peak fare elimination results in substantial increases in off-peak ridership and helps to reduce peak period demands on the transit system. In addition, fare-free transit attracts new ridership, including former auto users. However, given transit's small share of total travel, the resulting reduction in overall auto travel and congestion has been minimal.

The increases in ridership following fare elimination have had a slight detrimental impact on schedule adherence. However, additional demand has been sufficiently dispersed across the system and time-of-day that the impact on total fleet requirements has been low. The major cost of fare-free programs is the loss of farebox revenues, which may be substantial. Hence, the societal benefits realized by a ridership increase must be carefully weighed against this cost.

In demonstration sites where off-peak fares have been eliminated systemwide, increases in group riding by youths changed the atmosphere on board the buses. Passengers felt a reduction in personal security and were disturbed by

inconsiderate behavior, active harassment, and vandalism. Several months into the demonstrations the number of reported incidents declined, indicating that the problem may be transitory in nature.

In both Trenton and Denver, a large percentage of the ridership increases obtained during the free-fare demonstrations was sustained even after off-peak fares were reinstituted. This suggests that temporary fare-free periods might be used as promotional strategies to increase transit patronage.

The largest ridership impact of downtown-area fare-free zones is an increase in mid-day usage of transit by downtown workers. It is, as yet, unclear whether a downtown fare-free zone has a direct effect on the revitalization of a central city area, or whether its influence is felt only when applied in concert with other measures. Continued effort will be expended in addressing this issue during FY79.

Road and Parking Pricing

By setting user changes in accordance with the cost of service provided, road and parking pricing mechanisms may be used to promote efficiency in the allocation and use of existing transportation resources. Although there has been little experience with user charges to date, collection of highway tolls and parking fees provide a basis for understanding the mechanisms involved. User charges are distinguished from common toll collection in that their level is set to promote efficiency in the use of a service, rather than to merely finance it. The pricing strategy is intended to act as a restraint on the use of low occupancy vehicles in congested areas. The SMD Program's first demonstration of parking pricing policies will be implemented in the fall of 1979 in Madison, WI, and a selection process is currently underway to identify candidate sites interested in the application of a variety of road and parking pricing strategies.

Pricing and Service Variations

Ongoing research efforts have indicated that changes in certain transit operating policies and management practices could result in more efficient utilization of existing transportation resources. Consequently, demonstrations which will be implemented during 1979 in Omaha, NE and Columbus, OH are intended to provide transit management with

improved information and analytical tools to ensure that available resources are utilized to meet local transit objectives in the most efficient manner. In addition, new and inexpensive techniques and procedures for collecting and analyzing information about the socioeconomic and travel characteristics of exiting and potential users, as well as the operating costs for each route, will be introduced.

An additional demonstration project, to be implemented during 1979 in Vancouver, WA, is intended to provide local transit operators with the empirical basis needed to evaluate the relative merit of implementing fare, as opposed to service, changes. The project will involve the serial application of improvements to an existing transit corridor and measurement of traveler response and the impacts of the various improvements on operating costs.

PARATRANSIT SERVICES

With the increasing concern about energy consumption, traffic congestion, air pollution, and the need to provide alternatives for those who do not have an auto available, policymakers have been looking more closely at the potential offered by paratransit services. Paratransit services are those that fall between single occupant automobile and fixed-route, fixed-schedule bus or train. Common forms include taxis, jitneys, dial-a-ride, carpools, vanpools, and buspools.

Paratransit systems often contain a mix of service components tailored to specific travel markets and coordinated with existing conventional systems. For some applications, paratransit services are more efficient and effective than conventional transit services. Demand-responsive services, such as shared-ride taxi or dial-a-ride, generally require fewer vehicles to provide coverage to low density areas and are particularly effective when origins and destinations are scattered throughout the area. These services can also be used as feeders to more coventional fixed-route service.

Ridesharing can be an attractive alternative to driving alone for commuters, particularly those not well served by conventionl transit. Such commuters include those who live relatively long distances from their work place and/or those who live in low density areas. By carpooling, vanpooling, and using subscription bus, commuters can save money and gasoline.

The paratransit program has been working on the development and testing of these innovative service techniques. Operational features, economics, and public acceptance and use are being examined in detail for each of these services within specific SMD projects.

Developing effective institutional arrangements for providing these services is as important as refining the operational details of the service techniques. Without an appropriate institutional environment, innovative paratransit services may never be initiated. Consequently, many demonstrations emphasize the development of new institutional frameworks in which a greater variety of transportation services may be offered to the public. An important concept that has emerged is that of transportation brokerage. Brokers act as general promoters for all forms of conventional and paratransit service, help match those wishing a service with providers of a service, and actively work to remove barriers to the more efficient use of existing transportation resources.

Demand-Responsive Transit

Demand-responsive transit is service provided upon request of users; vehicles are routed on a dynamic basis to serve the requests currently on file. The objectives of the SMD projects in this area are to test the viability of demand-responsive service, to determine when and where it can better serve (when compared to conventional fixed-route bus) dispersed travel patterns found in many communities, and to assess DRT's role in the provision of integrated services operating in a metropolitan area.

Several variations of DRT have been demonstrated within the SMD program. One of the major distinctions between projects has been the orientation of services. In some cases, DRT serves a defined area, operating in a many-to-many capacity within the service area. In other projects, although DRT operates in a defined area, the service is integrated with other existing transit service to facilitate travel outside the DRT service area. Under these circumstances the DRT service often acts in a feeder capacity, collecting and distributing passengers connecting to and from conventional transit services which link the community with the CBD.

Public versus private operation is another important distinction among the demonstrations. Public operation provides a greater opportunity to integrate the DRT service with existing fixed-route transit service. However, public

operation may create a problem over priority received by the DRT portion of operations and may be more expensive than a non-unionized, private operation which can use part-time drivers. The project designs have also varied in terms of the role of the lead agency, funding structure, and operational elements.

Areawide, integrated demand-responsive transit service is being demonstrated in SMD projects in Rochester, NY and Westport, CT. The Rochester, NY integrated transit demonstration began in 1975 with DRT service provided in two suburbs by the regional transit authority. Both services have coordinated transfers to fixed-route buses serving the downtown. Later, two additional service areas were added. These newer services are provided by a private operator who uses the transit authority's vehicles and who is paid by the number of hours of service provided at a negotiated rate.

In Westport, CT, the Westport Transit District implemented a shared-ride taxi service and integrated the service with their existing fixed-route operations. The District operates the fixed-route service, but the demand-reponsive transit portion is run through a private management contract.

Demand-responsive feeder service to existing fixed-route buses is being demonstrated in St. Bernard Parish, LA. The regional planning commission, which is running the project, has contracted with a private operator who provides both the fixed-route and demand-responsive service.

Experience with these and other demonstration projects has yielded several important operational and institutional findings.

The successful integration of public and privately operated services has been demonstrated. This accomplishment suggests that public agencies and private operators should be able to work together in the future to implement satisfactory service at reasonable operating costs.

Strong local support and a serious financial commitment on the part of participating communities appear to be important ingredients in developing successful DRT operations. Of course, the establishment of a close working relationship between the sponsoring agency and the service provider should enhance the possibility of successful implementation and operation.

Demand-responsive transportation systems were generally found not to be successful replacements for long established fixed-route services. DRT appears to be better suited to providing areawide and many-to-one coverage in low density areas where transit alternatives are not currently available and as a feeder service to existing fixed-route systems, particularly in large metropolitan areas.

Operational experience has shown that proper selection of a vehicle fleet and maintenance procedures can have a major influence on DRT level-of-service and operating costs.

Transportation Brokerage

The role of the transportation broker is to identify the travel needs of those individuals not adequately served by the existing conventional transit system and to arrange for service to meet these needs through the innovative use of other transportation providers. Brokers have promoted carpooling, vanpooling, and arranged for social service agency transportation as well as paratransit services in low density areas. Travelers whose needs can be met by the existing transit system are given the appropriate information. Through identification of travel needs, the broker is also able to make suggestions for modifications to the fixed-route system. In addition, the broker often takes an active role in removing barriers to more efficient use of existing resources.

The paratransit program's brokerage demonstrations include projects which promote alternatives to driving alone for commuters, ones which arrange services to meet the needs of the elderly and handicapped, and a project which focuses on general community needs. Commuter brokers in Minneapolis, MN and Knoxville, TN provide a matching service for carpools and vanpools, as well as identify fixed-route service available to commuters. The Knoxville broker also engaged in activities to support social service agencies, but they were more limited. In Mountain View, CA, the broker aimed at providing service to meet the travel needs of the elderly in one housing complex. The paratransit program has also done a study of brokerage activities in Kansas City, MO. A brokerage project aimed at meeting general community needs is being demonstrated in Chicago, IL.

While transportation brokers have exposed large numbers of their target populations to alternative travel options, they have not yet had a significant impact on the overall travel of their target groups. On the other hand,

Carpool pricing incentive - Golden Gate Bridge, California

Computer dispatching terminal - Rochester, NY

transportation brokerage has had significant success in removing institutional barriers to the efficient provision of service. Perhaps the most noteworthy example is the success of the Knoxville broker in removing vanpools from the state public utility commision's jurisdiction, resulting in significant reductions in insurance rates for vanpools.

Ridesharing

The ridesharing portion of the program has been promoted by interest in the success of recent employer-sponsored ridesharing programs, by a need to develop alternatives to conventional transit, particularly in markets where it is inefficient and ineffective, and by the pressing need to reduce energy consumption and air pollution.

While theoretically the two primary ridesharing modes -- carpooling and vanpooling -- could serve any purpose, in practice they have been limited to commuter travel. Commuters can reduce their commuting costs significantly by ridesharing, and their employers can reduce the expenditures they incur in providing subsidized parking. Other possible benefits include reduced local traffic congestion, improved employee on-time arrival at work, reduction in driving stress, and an expansion in the labor market available to employers.

The ridesharing demonstrations have differed with respect to target areas served and the type of ridesharing promoted. The Norfolk, VA vanpool project is aimed at Navy employees located on five large bases. The Golden Gate vanpool project is corridor-oriented (the Golden Gate Bridge corridor north of San Francisco). In Minneapolis, MN and Knoxville, TN, brokers promote vanpools and carpools. The Minneapolis project involves three multi-employer sites while the Knoxville project is areawide.

A significant finding of the ridesharing demonstrations has been the apparent unwillingness of commuters to shift from solo driving to ridesharing. Evidence from most of the current demonstrations suggests that the commuting cost reduction, believed to be the major comparative advantage of ridesharing, is not a sufficient incentive to induce significant changes in commuting modes. The most important incentives seem to be the convenience of the trip and the reliability of the pick-up and delivery arrangements.

Experience in the ridesharing demonstrations suggests that work-scheduling conflicts are significant deterrents to

forming carpools and vanpools. It has been found that potential vanpoolers and carpoolers are not willing to delay their arrival or departure by more than 10 to 15 minutes. It seems that small variations in work schedules can significantly reduce the potential matching of some individuals into pools. Active support and encouragement of ridesharing by employers can go a long way toward reducing this barrier.

Subscription Bus

Subscription bus is another form of ridesharing for commuters, appropriate when there are relatively large numbers of people making approximately the same trip. Subscription bus service differs from regular transit service because it requires a commitment by the riders to use it; single rides are generally not offered.

The paratransit program's involvement with subscription bus began with special evaluations of two successful, private subscription bus services -- one in Reston, VA and the other in Southern California.

Recently, a demonstration of subscription bus service was initiated in El Segundo, CA. This service was designed with several unique features: (1) by taking advantage of the staggering of work hours at the employment centers, vehicles are able to make multiple runs; (2) the service tries to maintain a high average load factor by using a deliberate overregistration policy; and (3) it hopes to attract riders with its low and flexible payment structure.

Examination of private subscription bus operations sugggests that long routes and careful growth policies, based on ridership committment, are key to their break-even operation. It may also be that private subscription bus operations can carefully control costs and service quality by threatening to cancel their contracts with the charter bus companies. Experience in the upcoming year with the El Segundo project should provide insight into whether subscription bus service can be operated successfully on shorter routes which permit more productive use of the buses.

TRANSPORTATION SERVICES FOR SPECIAL USER GROUPS

The SMD program is testing various approaches to the planning, design, implementation, and operation of transportation services for persons who, because of age,

income, or disabilities, are dependent on public transportation or special arrangements other than the private automobile to meet their mobility needs. Fixed-route transit's inability to be totally responsive to the transportation needs of this group, especially the handicapped and elderly, prompted the development of initiatives for improving their transportation alternatives.

The initiatives cover a range of service designs, institutional frameworks, funding and payment arrangements, and providers. The four general categories into which these concepts can be arrayed are:

1. Specialized Demand-Responsive Transportation -- door-to-door service with the subsidy provided directly to the operator;

2. User-Side Subsidies -- fixed-route or door-to-door service where the subsidy is provided directly to the user;

3. Social Service Agency Transportation -- pooling of agency transportation resources; and

4. Accessible Fixed-Route Bus Service -- level-change devices on regularly scheduled buses.

Specialized Demand-Responsive Transportation

Efforts to test transportation alternatives for special user groups started with the basic demand-responsive service model. This service allowed eligible users to request door-to-door transportation from the operator. The six current or recently completed SMD projects that are exclusively demand-responsive services or contain demand-responsive elements for special user groups are located in Portland, OR, the Lower East Side of Manhattan, NY, the Lower Naugatuck Valley, CT, Westport, CT, Rochester, NY, and Proviso Township, IL. These projects have been implemented to assess whether this service model is an effective and affordable method of accommodating the travel needs of the target populations.

Service providers have included transit operators, taxi firms, and a private non-profit corporation. Vehicle types utilized have been taxis, vans, and small buses. Settings have ranged from low-density, suburban communities to high-density, inner-city areas. The eligible population has most often been the elderly and handicapped, although low-income persons were included at one site and some restrictions were

Driver assisting elderly passenger aboard the vehicle

Control Center

"The LIFT" Specialized Transportation Service for the Elderly and Handicapped - Portland, Oregon.

placed on the eligiblity of handicapped and elderly persons at other sites.

These projects have been successful in increasing the mobility of the target populations. Several thousand passenger trips per month have been carried where this amount of capacity existed. Project services are used by about 25% of those eligible. Data show that most users make only a few trips per month on project services but that many of these trips would not be made if the services did not exist. Even though the overall tripmaking rate on project services is low, there is a small proportion of users who are highly dependent on them.

All of the project services operate at least one vehicle equipped to accommodate persons in wheelchairs. Project trips by wheelchair users ranged from 10 to 20 percent of all trips made by eligible persons.

Operating costs exhibited wide variation among projects due primarily to a number of site specific factors. In Portland, the only site where project trips are carried on both transit authority and taxi vehicles, it appears that trips contracted to taxi companies are less expensive than those provided by the transit authority, although a rigorous analysis of this has not yet been undertaken.

For agencies with no prior experience in operating demand-responsive service, this service form would require the establishment of a completely new set of procedures for vehicle control and communications, the hiring and training of dispatchers, call takers, and possibly drivers, and would present the added difficulty of maintaining a new type of vehicle. While these are not insurmountable problems, they are not trivial either.

Although not totally free of problems, one of which is the high passenger trip cost in comparison to regular fixed-route transit, demand-responsive services are a proven and effective mechanism for providing transportation for special user groups.

User-Side Subsidies

Subsidies for public transportation have traditionally been provider-side subsidies which are made available directly to the transportation provider for offering certain specified services at fares which do not generate sufficient total revenues to cover the cost of providing the service. The user-side subsidy offers an alternative method of

subsidizing transportation services. A provider accepts tickets or vouchers (or any mechanism used to provide evidence of trips delivered) from users, and redeems them from the subsidizing agency for a value established in advance. This value usually represents the difference between the fare paid by the rider and the total cost of the trip. However, it may also be applied in such a way as to permit subsidization of the difference between a discounted fare and the full fare in cases where the operator receives a provider subsidy as well.

The user-side subsidy is a useful method of subsidizing selected target markets, such as the elderly and handicapped, and offering various discounts based upon eligibility, transportation mode, or even trip purpose and time-of-day.

The most common application of user-side subsidies involves taxi service offered to a designated eligible market by those operators in the service area that are willing to participate. Taxis represent an underutilized transportation resource in most areas and offer potential advantages over a dedicated fleet of publicly operated vehicles including flexible capacity, shorter wait time, 24-hour service, and no advance reservation requirements.

The SMD program is sponsoring four ongoing demonstration projects in Danville, IL, Montgomery, AL, Kinston, NC, and Lawrence, MA, and a new project in Milton Township, a suburb of Chicago, IL. These sites differ in terms of socioeconomic characteristics, city size, and forms of transit (public and private bus, taxi) available. Different administrative policies, subsidy mechanisms, eligibility criteria, and fare discounts are being tested and compared. In addition to the demonstration projects, the SMD program has monitored and documented findings from several other user-side subsidy programs in Kansas City, MO, the San Francisco Bay Area, CA, Los Angeles, CA, and the State of West Virginia.

The basic viability and ease of administration of user-side subsidies has already been established. More recent analysis of project results have yielded a number of important findings regarding extent of use and characteristics of regular users, impacts of the discount rate on usage, administrative costs, and impacts on private providers.

Where user-side subsidies are offered to handicapped and elderly persons, about 15 to 30 percent of the total eligible market elect to register for the discounts.

Project registrants are distinguished from the rest of the eligible population by lower incomes and more limited access to an auto. Over 50% of the registrants take at least one project trip per month and the average trip frequency for all users varies between 3 and 8 trips per month. Handicapped, non-elderly persons are the most frequent users, with trip rates averaging up to 12 trips per month.

Providing subsidies for both bus and taxi modes extends the penetration of the target market, primarily because able-bodied persons will often choose the lower cost bus service over taxis. Monthly project bus ridership has been over twice that of project taxi ridership where both modes are subsidized. User fares for bus trips at these sites are $.20 or less, compared with discounted taxi fares averaging $.70 to $1.25.

For smaller communities (under 15 square miles) the average total cost of project taxi trips has been in the range of $1.80 to $2.05 per trip, including administrative costs (for registration of users, voucher ticket handling, reimbursing taxi operators, etc.).

There is no evidence as yet that competition among providers has improved the quality of service; however, to insure adequate coverage and a stable supply of taxis for project trips, it is desirable to involve as many providers as possible. Factors which influence the taxi operator's willingness to participate as a provider include reimbursement policies, relative profitability of project trips compared with other trips, complexity of the fare structure for project trips (especially if it differs substantially from that used for the general public), and the paperwork required for reimbursement. Smaller taxi firms are less likely to be interested in participating because of the burden of increased record keeping and paperwork.

Over 80% of the taxi companies at three of the four demonstration sites have become project providers. Participating taxi operators have generally favorable attitudes toward user-side subsidies and in some instances have reported increased revenues and/or increased demand during off-peak periods.

Social Service Agency Transportation

The provision of transportation to clients of social service agencies, particularly those funded by HEW, is an integral part of most agency programs. Recently, as lack of

transportation has been identified as a barrier to client receipt of services, budgets for agency transportation programs have been increased. The resulting network of individual agency transportation programs is fragmented, duplicative, and often inefficient. There has been little coordination among the agencies operating within a region to ensure that transportation resources are allocated and utilized in the most cost-effective manner.

A wide variety of approaches to service coordination are currently being tested within the SMD Program, but the major objective of agency involvement in all of the projects is the same -- to more efficiently utilize existing resources by realizing economies of scale in the provision of transportation. Agency roles in the various projects range from informal cooperation and referral to physical consolidation of resources and labor.

In the Lower East Side of New York City, social service agencies which have no financial or physical resources to coordinate are cooperating with and referring clients to an experimental paratransit service. In another example of agency cooperation, the West Virginia Department of Welfare contacts and registers eligible persons for a statewide user-side subsidy program. In both cases, the agencies stimulate demand and improve system productivity by presenting the service to their clients as acceptable transportation.

Coordination, in which the resources of several agencies are utilized in the delivery of transportation service, is being tested in three SMD projects. In Portland, OR, a specialized paratransit service which is operated by the transit authority has contracts with 19 area agencies for the delivery of service to agency clients. A paratransit broker will be established in Allegheny County, PA in 1979 to contract with existing for-profit and non-profit paratransit providers, and market the paratransit service to social serice agencies and unaffiliated elderly and handicapped individuals.

Finally, the first phase of a demonstration in Mercer County, NJ was to consist of the coordination of the transportation resources of human service agencies, the public transit agency, and private transportation providers under an operating agency within the County. The coordination aspect of the Mercer County project did not prove to be very successful. Therefore, consolidation, the second phase of the demonstration, was initiated without ever achieving full coordination.

Consolidation, which provides for the integration of all administration and operations so that only one organization is responsible for all transportation functions of participating agencies, is also being tested in Will County (Joliet), IL, one of the service areas in the Northeastern Illinois paratransit demonstration.

In all of the demonstration sites, difficulties in achieving agency coordination have been encountered, making it necessary to continually refine the demonstration concepts to conform with the needs and requirements of area agencies. The process requires that participating agencies relinquish control over individual transportation services, with which they and their clients may be satisfied, in exchange for service of an uncertain quality. Therefore, agencies most willing to participate generally provide little or no transportation services -- leaving the coordinating agency with the task of serving a large demand with scant supply. It has also been found that participating agencies must complement each other with respect to their characteristics, needs, and available resources. There is some early evidence that many of these barriers may be largely circumvented in a consolidated system. Consequently, Mercer County's efforts at consolidation will be closely studied during the next year.

It is not yet known whether coordination or consolidation are cost-effective means of providing transportation service to agency clients. Data from Allegheny County and Mercer County will prove useful in addressing this issue.

Evidence from the demonstration projects suggests that increased availability of paratransit service has a positive impact on the mobility of the homebound and the transportation handicapped, enabling them to participate more frequently in agency activities.

Accessible Fixed-Route Bus Services

The provision of level-change devices on fixed-route transit buses, which to date has been a lift mechanism that will accommodate wheelchair users as well as other persons with difficulties climbing stairs, is a relatively recent addition to the family of transportation services for special user groups. The number of transit authorities ordering these buses is growing rapidly. This list will soon grow even faster as every Federally funded transit bus ordered after July 2, 1979 will have to be accessible.

In order to provide information concerning the implementation, operational experience, and usage of these accessible bus services by the handicapped, the SMD program is evaluating accessible bus services in several locations. Demonstrations of fully accessible, small urban area bus systems are being conducted in Palm Beach County, FL and Champaign-Urbana, IL. Partially accessible, locally initiated, large urban area bus systems are being evaluated in St. Louis, MO and Washington, DC. Other partially accessible, large city systems are being identified for possible evaluations.

Six transit authorities were operating fixed-route accessible service by January 1979. These were located in San Diego, CA, St. Louis, MO, San Mateo, CA, Santa Clara, CA, Detroit, MI, and the State of Rhode Island. However, for most of these operations available data are generally quite limited. The exception is St. Louis, where the SMD program performed a special evaluation. The St. Louis results are clouded somewhat by the severe lift problems encountered. Nevertheless, much of the St. Louis data are still useful, and some of the results have been corroborated at other sites.

Implementation strategy differs among transit authorities. A few have chosen to make a limited number of routes fully accessible but most have decided to make a larger number of routes partially accessible in order to provide greater area coverage. The general policy has been to make no schedule changes initially but to observe operations to see if any are necessary. Two transit authorities did make operational or schedule changes in implementing accessible service, however. Another policy decision involves whether or not to allow non-wheelchair users on the lift. The manner in which some lifts operate makes the low headroom clearance at the door frame a potential safety hazard. Nevertheless, the majority of operators are permitting non-wheelchair users on the lift.

Experience has shown very few persons using the lifts. Latest ridership figures indicate only 2 to 3 wheelchair or other lift users per day at most on any of the accessible bus systems. Most of the operators are running less than thirty accessible buses. Equipment malfunctions have been a problem for several of these authorities as well as for a few others that have not yet begun service. Some of these problems have been quite severe. However, recent developments give rise to the expectation that equipment unreliability may not be as much of a problem in the future.

A survey of wheelchair users was conducted in St. Louis to determine why these people were not using accessible buses. Principal reasons given were general mobility difficulties, including the difficulty of getting to the bus stops, and the availability of other modes of transportation. Lift equipment unreliability was not cited as a major factor.

Accessible bus service will involve some added costs for the operator. Maintenance and repair of lift equipment has been very costly in San Diego and St. Louis. However, as lift equipment reliability improves, repair costs should be reduced. Other costs associated with accessible bus operations include: equipment purchase (lifts, tiedowns, etc), the cost impact of schedule or operational changes (if any), extra personnel (mechanics and supervisors), driver training in operation of the lifts and handling the passengers, promotion and advertising of the service, accident claim settlements, and staff support. The amount of added cost is dependent to a great extent on the number of buses in service and the deployment strategy.

Comparison of Special User Group Service Concepts

Specialized demand-responsive and door-to-door user-side subsidy services offer generally similar transportation, although operational aspects may differ somewhat. User-side subsidy services are used more heavily than demand-responsive services. The fact that there is no advance reservation requirement may be the principal reason for the higher user-side subsidy ridership even though these users often pay a higher fare.

The cost of carrying a passenger does appear to differ substantially between user-subsidized and demand-responsive services. The latter, frequently operated by a transit authority, usually have higher administrative and overhead costs and often pay high union labor rates. The former, frequently operated by taxi companies, normally pay lower wage rates and usually have lower overhead and administrative costs. The user-side subsidy concept may also provide an effective incentive for fixed-route bus service run by a private operator under contract to a municipality or transit authority. However, it should have the same user impact as any fixed-route bus service with a reduced fare for certain user groups.

Both special demand-responsive services and user-side subsidy services will generally have a wider impact than most social service coordination projects since the target

Wheelchair passenger boarding "Easyride" specialized transportation service vehicle - New York City, New York

populations and trip purposes allowed are less restricted. Coordination services are most often limited to social agency clients or program participants, and due to service capacity limitations, trips are normally permitted only to agency offices or programs. Unaffilitated individuals or non-agency related trips may be allowed if excess capacity exists, but this will probably be the exception rather than the rule. Since there are no operating cost data available for social service agency transportation service provision, comparison with the other special user group transportation alternatives is not possible.

Comparison of accessible fixed-route and demand-responsive transportation is difficult due to the different nature of the services. However, since wheelchair users have been targeted as major beneficiaries in both services, a comparison of average wheelchair-user ridership is appropriate. Most fixed-route accessible bus services carry only a handful of wheelchair users per week. None have come close to carrying the number of wheelchair riders carried on special demand-responsive services. The low ridership also makes the cost per trip very expensive. Huge increases in wheelchair user ridership must be achieved before costs per trip become comparable with demand-responsive services. Even though accessible bus services are generally in the early stages of development and some ridership increases are anticipated, wheelchair users face so many other travel barriers that huge increases in ridership will be difficult to achieve.

The issue of which approach is best can only be assessed by examining the service goals and objectives, currently available transportation resources, and the target populations. The general handicapped and elderly population in most instances can be best served by a door-to-door service. The maximum ridership will be achieved by a no-reservation and low fare policy. Where taxi service is already available, utilization of this existing fleet will usually result in the lowest cost. In general, private operators can also be expected to provide a lower cost service than can be offered by a transit authority. If a number of social service agency transportation systems exist in an area, coordination or consolidation of these resources may be the most effective system. In rural areas it is not yet known whether fixed-route or demand-responsive service is most cost-effective. For wheelchair users lift-equipped vehicles are a necessity. Taxi fleets are unlikely to include a large number of such vehicles. Door-to-door lift-vehicle service would help the greatest number of wheelchair users.

There are a number of other factors which complicate the service concept selection. Included among them are: service area size, available funding sources, political considerations, and labor considerations. However, the demonstrations have proven that there are a range of effective means of providing transportation service for special target groups.

Future Activities

Any new demand-responsive service demonstration for special user groups will likely concentrate on inner city residents. Otherwise, efforts will consist primarily of learning more about the impact and the effects on users of current demonstration services.

During the next fiscal year, user-side subsidy evaluations should provide information on a number of issues of interest. These include project effects on taxi company operations and profitability, characteristics of users and non-users, user attitudes and travel behavior, factors affecting the mode choice between bus and taxi user-subsidy services (where both are available), cost comparison of bus versus taxi services, and reasons for project non-use.

An important question which cannot be answered from the current set of projects regards the viability of user-side subsidies in large cities. The SMD program is reviewing potential sites for a user-side subsidy demonstration in a large city in order to answer this question.

As the demonstration projects in the area of social service agency transportation in Mercer County and Pittsburgh progress, the impact of coordination on participating agencies and their clients will be more rigorously assessed. Careful attention will be devoted to a thorough study of the impact of coordination on the quality of the service provided and whether economies can be realized in its operation.

Future SMD efforts will include a series of special studies of locally initiated coordination projects which should yield insight into feasible approaches to coordination. It is possible that an existing planning study will design a demonstration of the coordination concept which will receive SMD funding.

The SMD program will see two fully accessible fixed-route bus sysems initiate service during the coming year. Intensive efforts will be exerted in the demonstration

evaluations to assess the service-related impacts on users, operators, and regular bus riders. Reasons for non-use will be further investigated. The effect of the weather on lift usage will be analyzed. If data collection resources permit, the utilization and usefulness of accessible bus features other than the lifts and tiedowns will also be analyzed.

The SMD Program will also continue to monitor and report on accessible bus operations in several locations around the country in order to disseminate the latest ridership, cost, and equipment reliability data. It is anticipated that at least one more full evaluation of a large scale, locally initiated, partially accessible bus system will be conducted in order to have data from another large city to compare with the St. Louis and Washington, DC experiences.

SUMMARY AND FUTURE DIRECTIONS OF THE SMD PROGRAM

With the completion of evaluations on a number of long running demonstrations during FY78, the Service and Methods Demonstration Program has reached a level of maturity in which its contributions to policy formulation and implementation, technology development, transportation planning practice, and transit operations are becoming apparent. Recent findings from demonstrations of transportation services for special user groups will help local areas to develop cost-effective interim services to meet the Department of Transportation's Section 504 requirements. The results of the priority treatment demonstrations contain valuable information for local transportation planners in designing appropriate Transportation Systems Management Elements for their 3-C planning processes. In the area of transit operations, the demonstration of innovative management techniques, fare and service policies, and paratransit alternatives are expanding the options available to local transit authorities in providing better quality, more attractive and more efficient public transportation services. Finally, the recent work in traffic restraint strategies is opening the door to a better understanding of the potential impacts of transportation on urban structure.

As indicated by the discussion of future projects throughout this report, the SMD Program will continue in its role of testing innovative concepts in the areas of conventional transit service, pricing, paratransit, and special user group services. However, the prinicpal focus

Golden Gate Commuter Van - California

of many future projects will change in response to current and anticipated priorities within UMTA and DOT. In particular, future demonstrations of transportation for special user groups will focus on the implementation of interim services in large urban areas which will not be able to achieve full, systemwide accessibility in the near future. They will also focus on the coordination of social service agency transportation resources with particular emphasis on institutional barriers and improved effectiveness achieved through consolidation.

In the area of paratransit services, future activities will investigate ways to overcome institutional barriers to service implementation through such mechanisms as the transportation broker, and on integrating paratransit with conventional fixed-route services to achieve greater efficiencies in meeting the transportation needs of an area.

Future pricing demonstrations will focus heavily on the tradeoffs travelers make between fare and level-of-service changes, and will explore innovative methods of fare collection as well as the feasibility of using road and parking pricing to achieve efficient allocation of transportation resources. Finally, in the area of conventional transit service improvements, future activities will focus on service improvement in congested downtown areas and on innovative strategies to improve service in low density, suburban areas.

The ultimate goal of the SMD Program is to provide useful, objective information in a timely fashion, which can be used by Federal, state, and local decisionmakers to formulate more rational, effective and equitable transportation policies. The findings summarized in this report and in other current and future SMD publications are directed toward that goal.

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